

Trig, Product and Quotient Rule Practice

Date _____ Period _____

Differentiate each function with respect to x .

1) $y = (-4x^2 - 3)\csc 3x^4$

2) $y = (-x^2 + 2)\cot 4x^5$

3) $y = (-3x^3 - 4)\csc 5x^5$

$$4) y = \sin x^3 \cdot (-3x^5 - 1)$$

$$5) y = \tan 5x^2 \cdot (-4x^4 + 3)$$

$$6) y = \frac{\cos 2x^2}{4x^3 + 5}$$

$$7) y = \csc 5x^5$$

$$8) y = \frac{\cot 5x^5}{-x^2 + 2}$$

$$9) y = \csc \frac{x^2}{x^4 - 3}$$

$$10) y = \sec \frac{3x^2}{4x^3 - 3}$$

Answers to Trig, Product and Quotient Rule Practice (ID: 1)

$$1) \frac{dy}{dx} = (-4x^2 - 3) \cdot -\csc 3x^4 \cot 3x^4 \cdot 12x^3 + \csc 3x^4 \cdot -8x$$

$$= 4x \csc 3x^4 \cdot (12x^4 \cot 3x^4 + 9x^2 \cot 3x^4 - 2)$$

$$2) \frac{dy}{dx} = (-x^2 + 2) \cdot -\csc^2 4x^5 \cdot 20x^4 + \cot 4x^5 \cdot -2x$$

$$= 2x(10x^5 \cdot \csc^2 4x^5 - 20x^3 \cdot \csc^2 4x^5 - \cot 4x^5)$$

$$3) \frac{dy}{dx} = (-3x^3 - 4) \cdot -\csc 5x^5 \cot 5x^5 \cdot 25x^4 + \csc 5x^5 \cdot -9x^2$$

$$= x^2 \csc 5x^5 \cdot (75x^5 \cot 5x^5 + 100x^2 \cot 5x^5 - 9)$$

$$4) \frac{dy}{dx} = \sin x^3 \cdot -15x^4 + (-3x^5 - 1) \cdot \cos x^3 \cdot 3x^2$$

$$= 3x^2(-5x^2 \sin x^3 - 3x^5 \cos x^3 - \cos x^3)$$

$$5) \frac{dy}{dx} = \tan 5x^2 \cdot -16x^3 + (-4x^4 + 3) \cdot \sec^2 5x^2 \cdot 10x$$

$$= 2x(-8x^2 \tan 5x^2 - 20x^4 \cdot \sec^2 5x^2 + 15 \cdot \sec^2 5x^2)$$

$$6) \frac{dy}{dx} = \frac{(4x^3 + 5) \cdot -\sin 2x^2 \cdot 4x - \cos 2x^2 \cdot 12x^2}{(4x^3 + 5)^2}$$

$$= \frac{4x(-4x^3 \sin 2x^2 - 5 \sin 2x^2 - 3x \cos 2x^2)}{(4x^3 + 5)^2}$$

$$7) \frac{dy}{dx} = -\csc 5x^5 \cot 5x^5 \cdot 25x^4$$

$$= -25x^4 \csc 5x^5 \cdot \cot 5x^5$$

$$8) \frac{dy}{dx} = \frac{(-x^2 + 2) \cdot -\csc^2 5x^5 \cdot 25x^4 - \cot 5x^5 \cdot -2x}{(-x^2 + 2)^2}$$

$$= \frac{x(25x^5 \cdot \csc^2 5x^5 - 50x^3 \cdot \csc^2 5x^5 + 2 \cot 5x^5)}{(-x^2 + 2)^2}$$

$$9) \frac{dy}{dx} = -\csc \frac{x^2}{x^4 - 3} \cot \frac{x^2}{x^4 - 3} \cdot \frac{(x^4 - 3) \cdot 2x - x^2 \cdot 4x^3}{(x^4 - 3)^2}$$

$$= -\frac{2x \csc \frac{x^2}{x^4 - 3} \cdot \cot \frac{x^2}{x^4 - 3} \cdot (-x^4 - 3)}{(x^4 - 3)^2}$$

$$10) \frac{dy}{dx} = \sec \frac{3x^2}{4x^3 - 3} \cdot \tan \frac{3x^2}{4x^3 - 3} \cdot \frac{(4x^3 - 3) \cdot 6x - 3x^2 \cdot 12x^2}{(4x^3 - 3)^2}$$

$$= \frac{6x \sec \frac{3x^2}{4x^3 - 3} \cdot \tan \frac{3x^2}{4x^3 - 3} \cdot (-2x^3 - 3)}{(4x^3 - 3)^2}$$